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- Support CPU voltages Auto-detect

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- Support CPU voltages Auto-detect

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A Fresh Technology Driver...

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Why Price Is Not Enough

When I was a little girl, I remember sitting in the front pew at church, squaring secondarily as the minister, who also, happened to be my father, mounted the personal details of my young life to the congregation in the interest of a segue to his point.

In light of that painful memory, I can sympathize with my spouse, as I'm about to publicly account how he didn't get the best price on his most recent technology purchase. Indeed, his goal was to buy a laser printer for his company, and he set out to look at many brands and models to try to find the right printer for his business needs — and, of course, to get a good deal!

However, he was very impressed with one retailer who spent considerable time with him, and addressed his questions and concerns about printers in a knowledgeable and helpful manner. So much so, that even though another store was selling the exact printer at a cheaper price, my husband decided to pay the extra money in the interest of the exceptional service rendered.

Service is a big part of the quality of any product or business. Behavior such as my spouse's ties into the equation. Value + Quality = Price, proposed by futurist Richard Worel, author of *The Next 20 Years Of Your Life*.¹ He was guest speaker at a recent StorageTek road show (The show featured the Canadian-made REX automated, daily back-up solution, aimed particularly at small businesses and mobile workers, starting at \$22 per month.) As most companies are realizing the role of product quality in value, Worel said, quality becomes mainly irrelevant — since you've got it.

Indeed, he quoted author Tom Crampton: "What competition is anyone who meets the expectations of your customer. Your customer compares your transactions with transactions with Disney, FedEx and L.L. Bean, not just the company across the street that happens to be in the same industry." Then, *Are de Gans*, a futurist with Royal Dutch Shell: "Learning faster than your competitors is the only sustainable competitive advantage in an environment of rapid change and innovation."

This month, our Letters section (page 8), features a letter from a Canadian retailer asked if being forced to compete directly with some of his distributors, as

government bids. Because that retailer wasn't prepared to go completely public with his complaints, we agreed to publish the letter without naming him. However, channel conflict is one of those issues that just isn't going away. Some industry watchers think the level of conflict is actually worsening, due to the advent of Internet sales, which makes the "direct" option even more appealing for some manufacturers and distributors.

Just as you appreciate customer loyalty, and hopefully reward it, it's up to you to express loyalty to those among your suppliers that obviously have your interests in mind, as well as their own. If you're feeling market competition from your very suppliers, there is a real problem with somebody's business model. The upside to a competitive market means you can express your appreciation or your dislike of your partners' approach to business with your feet and your pocketbook.

Having said that, however, it's possible to get overly hung up on price. If price is the only true differentiating factor in your business — sorry.

This issue, we're running a special feature on distributors. Please see "Distributors: A previous proposition?" (page 34) for a discussion on how Canadian distributors are trying to both specialize and diversify their offerings in the ever-evolving battle for market share, revenues and profits.

Technology-wise, low-cost ink-jets are heating the market with fabulous capabilities when it comes to both black-and-white and color printing. See Lab Test (page 40) for our top picks among the sub-\$500 ink-jet printers. Also, check out the special report on Networking by Associate Editor Jeff Davis for an overview of the market and opportunities, particularly in the light of today's Internet reality (Please see: "Connect The Dots," page 22.)

And for an analysis of the tough desktop publishing business, don't miss "Who NW Saw Desktop Publishing?" (page 30) by contributor Gail Wherhafft.

Enjoy the issue.

What do you think of our coverage, and which technology or market issues concern you? Drop me a line at grace@cancomp.ca.

Grace Cunniff
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Professional business ethics and integrity

For some time now I have observed what I would consider "unfair business practices" and lack of ethics from some distributors.

Like most resellers and VARs, some of our business focus is on government tenders. Occasionally we turn towards certain distributors to provide us with a quote on these tenders. I was quite surprised to see them bid directly on those same offers I have to ask: "What are the chances for any of us to ever participate with a tender that has been bid on by a distributor?"

Is this a common practice?

What's interesting is the fact that even the Industry Canada Competition Bureau does not see this situation as being unusual. A worker at the Competition Bureau did recognize that a distributor would have an unfair advantage over a VAR/reseller but there are no laws preventing such actions unless there is proof of collusion.

Am I the only one that thinks that this is unfair business practice?

How many more of us feel wronged by this situation?

Canadian reseller

(Name withheld after publication on request.)

Support the underdogs!

I like things about both Isosys, however the right clickable "Send Page" in Netpage has Internet Explorer 4.0 beat by a long shot.

I send information to my clients whose e-mail addresses I have in my database. They appreciate the articles I send them that they may otherwise have missed.

Managers are not good! Even though I am a registered Microsoft reseller, I would have to pay Microsoft in order to help a client with error messages in the Win 95 operating system! On the other hand, as a registered Comel reseller of WordPerfect online, I have free access to help!

We need more underdogs and fewer "dogs!" Support alternative software!

Charles Pothier, consultant
Computersystems, Montreal, Que.
cpothier@net.com

Joined To The Web**Which Microsoft products are Year 2000-ready?**

Visit the Product Guide section at <http://www.microsoft.com/year2000> to look up Microsoft products for their Year 2000-readiness. Products listed as not compliant include Word 8.0 for DOS, Access 2.0 and Office 4.x; Professional Edition Windows 95 is considered "compliant with minor issues." Visit the site for the details.

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Letters To The Editor

We welcome your letters on industry news and concerns, as well as your comments on our magazine.

We reserve the right to edit your contributions for length and clarity.

Please write to The Editor via e-mail at ccw@top.ca, or fax: (604) 633-1686.

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- Supports Pentium® II 233 ~ 333 MHz processor cartridge
- Intel 440LX chipset supports Ultra DMA/33 IDE protocol, ACPI and AGP 66MHz/133MHz (Sideband) 3.3V device
- Four 168-pin DIMM sockets for 3.3V unbuffered DRAM modules support SDRAM, EDO DRAM
- Supports up to 512MB MAX. 16, 32, 64, 128MB EDO or SDRAM and ECC function
- ATX Form factor, Four PCI slots, Three ISA slots and one AGP slot



AH6

- CPU SDFI MENU™: Jumperless Technology
- Supports 66, 75° and 83°MHz CPU external clock speeds
- Supports Pentium® II 233 ~ 300 MHz processor cartridge
- Intel 440LX chipset supports Ultra DMA/33 IDE protocol, ACPI, and AGP 66MHz/133MHz (Sideband) 3.3V device
- Three 168-pin DIMM sockets for 3.3V unbuffered DRAM modules support SDRAM, EDO DRAM
- Supports up to 384MB MAX. 16, 32, 64, 128MB EDO or SDRAM and ECC function
- ATX form factor, One AGP slot, Three PCI slots and Two ISA slots



IT5A

- Supports 50, 55, 60, 66, 75°, 83°, 100°MHz CPU external clock speeds
- Supports Pentium® processors and Pentium® processors with MMX™ technology: AMD K5™/K6™, Cyrix 6x86™/6x86L™/6x86MX™, IDT WinChip C6 processors
- ALU Aladdin 5 chipset supports Ultra DMA/33 IDE protocol, ACPI and AGP 66/133 MHz (Sideband) 3.3V devices
- Two 168-pin DIMM sockets for 3.3V unbuffered DRAM modules support SDRAM, EDO DRAM up to 256MB
- ATX form factor, Three PCI slots, Two ISA slots and One AGP slot
- PCBT Compliant



AX5

- CPU SDFI MENU™: Jumperless Technology
- Supports 50, 55, 60, 66, 75°, 83°MHz CPU external clock speeds
- Supports Pentium® processors and Pentium® processors with MMX™ technology: AMD K5™/K6™, Cyrix 6x86™/6x86L™/6x86MX™, IDT WinChip C6 processors
- Intel 430 TX chipset supports Ultra DMA/33 IDE protocol, ACPI and Windows 95 soft off
- Three 168-pin DIMM sockets for 3.3V unbuffered DRAM modules support SDRAM, EDO DRAM, and Four 72-pin SIMM sockets support EDO & FP modules, up to 256MB
- ATX form factor, Four ISA slots, four PCI slots



TX5

- CPU SDFI MENU™: Jumperless Technology
- CPU Monitoring Management (E8CA)
- Supports 55, 60, 66, 75°, 83°MHz CPU external clock speeds
- Supports Pentium® processors and Pentium® processors with MMX™ technology: AMD K5™/K6™, Cyrix 6x86™/6x86L™/6x86MX™, IDT WinChip C6 processors
- Intel 430 TX chipset supports Ultra DMA/33 IDE protocol, ACPI
- Two 168-pin DIMM sockets for 3.3V unbuffered DRAM modules support SDRAM, EDO DRAM, and Four 72-pin SIMM sockets support EDO & FP modules, up to 256MB
- Baby AT form factor, Three ISA slots, Four PCI slots



PX5

- CPU SDFI MENU™: Jumperless Technology
- Supports 50, 55, 60, 66, 75°, 83°MHz CPU external clock speeds
- Supports Pentium® processors and Pentium® processors with MMX™ technology: AMD K5™/K6™, Cyrix 6x86™/6x86L™/6x86MX™, IDT WinChip C6 processors
- Intel 430 TX chipset supports Ultra DMA/33 IDE protocol, ACPI
- Two 168-pin DIMM sockets for 3.3V unbuffered DRAM modules support SDRAM, EDO DRAM, and Four 72-pin SIMM sockets support EDO & FP modules, up to 256MB
- Baby AT form factor, Four ISA slots, Four PCI slots

" THE FUTURE TREND OF MOTHERBOARD THE NEW SOFTMENU™ II-Jumperless Technology "



BX6

- CPU SOFT MENU™ II - Jumperless Technology
- Supports Pentium® II 350 - 400 MHz processor cartridge (Based on 100MHz clock), Pentium® II 233 - 333 MHz processor cartridge (Based on 66MHz clock).
- Intel 440BX chipset supports Ultra DMA/33 IDE protocol, AGP 66MHz/133MHz (Sisobond) 3.3V device
- Four 168 pin DIMM sockets support SDRAM module
- Supports up to 512MB MAX. (8, 16, 32, 64, 128MB SDRAM) and ECC function
- ATX Form factor, One AGP slot, Four PCI slots and Three ISA slots

THE NEW SOFT MENU™ II :

It is time to upgrade again and this motherboard is the perfect basis for your whole system. The ABIT BX6 comes with Intel's new high-end chipset announced on April 16 to support the new Pentium® II 350 MHz and 400 MHz CPU's. Better yet, this motherboard is backwards compatible to support all Pentium® II CPU's currently on the market. That means that you can use your current Pentium® II CPU with the BX6 and get a performance boost from all the latest features of Intel's 440BX chipset. Furthermore, you can benefit from ABIT's new Soft Menu™ II which allows for the first time ever, voltage adjustment for Pentium® II CPU's, plus faster boot times compared to the original Soft Menu™, and on-board hardware temperature monitoring.

*Bus speeds of 75, 83, 113, and 133 MHz CPU bus speeds are supported but not guaranteed due to the CPU and chipset specs.





Windows 98 goes public on June 25, says Microsoft

Microsoft Corp. says it will make the next generation of its desktop operating system, Windows 98, available to the public on June 25.

More than 130,000 consumers worldwide have been participating in the Consumer Beta Preview Program for the operating system.

Microsoft says the new product opens applications 16 per cent quicker on average, and says graphics and shutting down the PC are up to five times quicker than with Windows 95. Moreover, Microsoft claims the operating system uses hard drive space more efficiently — and on average, users should expect to have 35 per cent more free disk space.

The upgrade version for users of Windows 95 or Windows 3.1 is \$149.

Tech Data buys Computer 2000 for more European coverage

Expanding its European presence, distributor Tech Data Corp. has purchased a majority interest in Computer 2000, which has more than 40 distribution subsidiaries in 30 countries.

Steven Raymond, Tech Data's chairman and CEO, said this was a big step in Tech Data's European expansion plan. "We've committed to participating in the European market," he said.

While the purchase won't have a direct impact on Tech Data Canada Inc. or Canadian resellers, Raymond said larger Canadian resellers selling into Europe may be attracted by a working with a distributor that can provide support "on both sides of the marketplace."

Tech Data Corp. is doubling its revenues with this acquisition. The two companies expect to achieve revenues of US\$15 billion in this calendar year. Raymond said the merged company should be able to achieve economies of scale, with more purchasing power and more money to invest in the universal information technology infrastructure.

Motorola MVME147 SBC celebrates one decade!

The Motorola Computer Group has announced the 10th anniversary of the MVME147 single board computer (SBC), necessary for such applications as interconnecting equipment, diagnostic instrumentation, process control and industrial handling equipment.

The MVME147 and the Delta Series VME systems have been used for lines and real time VME computers.

Motorola says significant enhancements have been made to the manufacturing process



es for the MVME147 over the last decade, such as the migration from a through-hole assembly with many discrete devices to a surface-mount design with ASICs consolidating much of the onboard logic.

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- 100MHz System Bus (FSB)
- Supports Pentium® II 233-400MHz
- Enhanced ACPI Features
- New Anti Boot Virus BIOS

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enhanced ACPI BIOS

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- Intel 82558 100/10Mbps LAN Controller
- Enhanced ACPI Features
- New Anti Boot Virus BIOS



P2B-05

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- Adaptec 80MB/sec AC1100 Ultra2 SCSI
- Enhanced ACPI Features
- New Anti Boot Virus BIOS



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Domtar tells suppliers to beat millennium bug or else

(NB) — Canadian pulp and paper giant Domtar Ltd. has sent a strongly worded ultimatum to hundreds of its suppliers, advising them to guarantee their computers are rid of the so-called "millennium bug," or face the loss of Domtar business.

The ultimatum calls for guarantees from each supplier that not only will their computers be able to provide products and services "without interruption or delay" before, during and after "calendar year 2000," but that their suppliers in turn will make such assurances.

CANARIE hands out technology industry awards

(NB) — Five Canadians were honored at the 1999 National IWAY Awards, given out in Toronto recently by Canadian Network for the Advancement of Research, Industry and Education (CANARIE) Inc. and the Canadian Advanced Technology Association (CATA) and sponsored by the Royal Bank of Canada.

This year's winners were Jean-François Monette, president of CIFRA Medical Inc. in Sainte-Foy, Que., for new-technology development; Doug Hall, director general of Industry Canada's Information Highway

Applications Branch, for explanation of technology; Dr. Paul Patterson, senior chairholder in management technology change at University College of Cape Breton in Sydney, N.S., for community service; Randy Menden, president and chief executive of Maelenta Communications Inc. in Edmonton, for adaptive technologies; and Lionel Hurrebaut, chairman of Breason Communications Inc. in Mount-Royal, Que., for public leadership.



Skills shortage makes Year 2000 scarier

(NB) — Even those organizations that woke up to the year 2000 problem in time may face a big obstacle in trying to correct it: people. There simply are not enough people in Canada with the necessary skills, and there is little time to train more.

How big is the problem? "In a word," says Vince Forestall, president of Drexler Technology Management in Toronto, "all big letters, BIG." Forestall's firm places information technology professionals and provides IT asset management services. He said that the worse for many organizations will not be how much money they are willing to spend to fix their year 2000 problems, but whether they can get the necessary expertise at any price.

Joe Savina, executive director of the Global Millennium Foundation in Ottawa, said many large organizations have yet to wake up to the year 2000 problem. As they do, the demand for the skills needed to fix it will only grow. Already the cost of year 2000 expertise is going up rapidly, and Forestall: "That's not going to be paying 50 per cent more this year than they would have paid last year."

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Microsoft Canada will reward software retailers

Microsoft Canada is seeking nominations of software retailers for the Microsoft Canada Golden Award. According to Microsoft, the award is designed to recognize leadership in the retail sector of software retailing.

Under the nomination process, customers are asked to rate retailers on a scale of one to five in the following categories:

• professional staff,

- knowledgeable staff,
- hours of operation,
- customer service,
- product selection,
- store ambience, and,
- overall shopping experience.

Awards will be presented in three categories: large chain, small chain and single store. Nomination forms are available at: <http://www.microsoft.com/canada/awards>.

HP helps resellers support outsourcing

Hewlett-Packard (Canada) Ltd. has announced a multi-tiered program to support resellers' efforts to deliver cost-effective and profitable services to owners of HP Brivo PCs, also good for small- and medium-sized companies without information technology staff.

The new HP Brivo Reseller Support Services program is designed to support resellers as "virtual" IT managers for companies without IT staff, says HP.

The program includes a free PoAnywhere Remote Support Tool to let resellers troubleshoot and resolve hardware and software problems anywhere through a modem or LAN; new reseller support services, including training programs, access to technical information and a dedicated telephone support number for resellers to get up-to-date product information; and an expanded line of aggressively priced HP Value Packs and accessories including network cards, memory and multimedia components. HP

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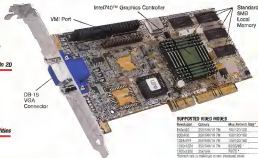
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800x600	64 (3D)	640Kb (3D)
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Searching for value add in a wired, commodified market



By David Tanaka

The Internet will have a greater impact than the telephone, and electronic commerce is redefining the supply chain — entangling customer with supplier as never before. That's the considered opinion of both Terry Koser, director of strategic technology services for Price Waterhouse's Global Technology Centre in Maple Park, Ohio, and Michael Cullywik, lead partner for the firm's technology industry practice in Vancouver, who recently presented a "Technology Forecast 1998" report.

Koser said interest in Internet commerce is high. There's been spectacular growth, as sales are doubling every four months, he

noted. He said even optimistic forecasters have been increasing their projections upward by 44 per cent every six months.

As a business-to-business process, e-commerce is nearly there. International Data Corp. estimates that by 2000, the value of Internet-based purchases will be more than US\$500 billion, of which nearly US\$140 billion will be business-to-business purchases.

In the consumer market, several "nailbats" still exist. These include the perceived lack of security, quality of telecom service issues, and the so-called "last mile bandwidth in the home."

The Last Mile?

The last mile issue is being explored on a num-

ber of fronts, including fibre optics to the home, ADSL and its variations, cable modems, traditional satellite technologies like DirecPC and newer satellite-based communication systems like Inmarsat or Teledesic's "Internet in the sky."

Solving the last mile issue is the key to creating the critical mass necessary for consumer e-commerce to be viable. Koser said 25 per cent of the population on-line represents the critical mass, and in the U.S., that point may be reached this year. Canada should have about 30 per cent on-line by the end of this year, although Japan won't reach that level until 1999, and some parts of Europe, not until beyond 2000. However, it's just a matter of time, and as companies gear up to do business on the Internet, the organizational focus must

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change from a "product out" orientation to a "customer in" one, said Kotler.

Web Commodification

Internet commerce will see the commodification of transaction-based exchanges, so the viability of e-commerce-based companies will rely on value-added services, not on the transaction itself.

This reality is already having an impact on the way some companies conduct their business. With competition from other sellers, and the huge amounts of information readily available to consumers about flights and prices, airline ticket agents, for example, don't make much money selling a ticket. They therefore must rely on providing services that consumers are willing to pay for.

But even without the influence of e-commerce, the commodification of PC products is a well-known phenomenon, and is one of the current big contributors to the distribution channel's retail and lease uncertainty.

A few months ago, I had lunch with Arthur Grovesman, vice-president and general manager of Toshiba of Canada Inc. He said we are quickly approaching a time when consumers will no longer be willing to pay dealer

markups on hardware, because hardware has become a commodity item, readily available from a number of sources. The consumer knows what the value of the goods are on the open market.

Weighing Value

Consumers are questioning the value in the so-called value add. Grovesman said customers will demand a detailing of value-added services and will want the option to pick and choose only the items that are of true value to them.

Other evidence of commodification comes from Evans Research Corp.'s "Purchasing Patterns in Small and Medium Businesses in Canada" study, released earlier this year. The report notes that only 16 per cent of the companies indicated third parties play a role in the actual procurement of products, like monitors and printers.

However, third parties were considered more important when purchasing more complex technologies like networking, systems integration and licensed-related products. In other words, there may be some remaining PC products that still qualify as "high-margin" sales, although even with networking,

companies like Bay Networks (with its NetGear line) are marketing the hardware as consumer commodities.

In terms of the war being for PCs, Kotler noted that segmentation is the main focus, not defining someone's PC market. He said the idea of a "good enough" PC will be as viable as the idea of the latest and greatest PC. "Some will need all the power they can get," said Kotler, "some will need only PC [or] Web TV."

Resolving the value equation in this new market may require sorting out the choices for the consumers who are being tempted by an ever-broadening array of PC appliances. □

David Towles is based in Vancouver and is Editor of The Computer Paper. He can be reached at dtowles@cp.ca.

"Customers will demand a detailing of value-added services, and will want the option to pick and choose only the ones that are of true value to them."

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Asus Issues Counterfeit Alert

by Alan Threault

Imitation has been said to be the sincerest form of flattery. But when someone's copying your product, damaging your reputation, and trying to gain some of your hard-earned market share, imitation goes by another name: counterfeiting.

This is the situation faced by ASUSTek Computer Inc., the manufacturer of Asus boards, and Supersonic Canada, sole distributor for Asus motherboards in Canada. ASUSTek (which has corporate offices in San Jose, Calif., Darmstadt, Germany, and Taipei, Taiwan) and distributor Supersonic in Toronto, have alerted readers to the recent appearance of counterfeit Asus motherboards.

The boards in question are unauthorized copies of the ASUS T397-E line Pentium board. "Sometimes we think it's great when someone counterfeits our product," said William Yang, regional manager for Asus Canada in a recent telephone interview. "After all, it must mean that we're doing a good job, and counterfeiting computer products isn't all that common. The real news, though, is that the quality of the counterfeit boards is very poor. The appearance and packaging of the counterfeit boards very similar to genuine Asus boards, but the quality of manufacturing is very coarse, the BIOS doesn't work, performance is poor, and the counterfeiters have a very high failure rate. That means that everyone gets hurt by the counterfeiters — the company, the reseller, and the end-user who's bought the counterfeit unit."

According to Yang, the counterfeit boards have been showing up in China, where Asus has a large portion of the market share for some time, but have only recently started turning up in North America. "In China," he said, "because we've got such a lot of market share, we've been used to seeing 10,000 to 20,000 counterfeit T397-E boards per month. That's about a one-in-one ratio to our legitimate models. It's hard to tell how many are actually leaving China, but beginning in November of 1997, they've started turning up in the Toronto market, in Vancouver, and in the U.S."

"Asus is a premium name, known for its high quality," says Paul Chiu, senior product manager for Supersonic Canada. "People are being offered T397-E boards at \$40 or \$50 less than the normal dealer price, it's sometimes hard to resist. The counterfeit board is being sold at a price that's lower than a Tier II clone board — even the grey market can't do better than that."

Grey market products — those that come into the country outside the normal distribution channels — at least have the virtue of being the real thing, and therefore living up to the manufacturer's standards. The counterfeit boards, however, are of inferior quality and performance. And that's a concern for resellers. "We've been promoting Asus motherboards for quite some time," says Herman Yoo, president of Orinco-based Northern Micro, a systems integrator who's been looking out for the counterfeit boards. "Asus boards are a quality product, so many of our customers, which include the federal government and a number of large corporations, standardized on Asus. Counterfeit boards would damage our reputation, and be harmful to us and to our customers."

The counterfeit Asus boards are different from real company product in a number of hard-to-spot details, which aren't likely to be noticed by an unsuspecting reseller, much less by an end-user.

The differences — such as missing trademark notices, serial numbers and product numbers, as well as poorly reproduced manuals, are listed (with example photographs) at the Asus Web site at <http://www.asus.com/usa/CompCopyRight.htm>.

Asus has struck at the source of the problem by taking legal action against known hardware counterfeiters in China. "We've sued someone we've been able to identify as producing counterfeit boards," says William Yang. "That suit is now in progress, and lets the counterfeiter know that we're serious about following this up."

"Clear as home, we're trying to educate both the reseller channel and the end-user about the problem — that's why all the information about the differences between the counterfeit and the real motherboards are available on our public Web site."

Readers can stay safe by buying T397-E boards only from Supersonic, Asus' authorized Canadian distributor.

But as with most things in life, this is a case of "buyer beware." As Supersonic's Chiu says: "If the price seems too good to be true — run, don't walk, away from the product." ■

Alan Threault is a Toronto-based journalist who specializes in high technology. He can be reached at atnord@procom.com.

"The appearance and packaging of the counterfeiters looks very similar to genuine Asus boards, but the quality of manufacturing is very coarse, the BIOS doesn't work, performance is poor, and the counterfeiters have a very high failure rate."

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Connect the Dots

Selling to the networking market

by Jeff Egan

In the old days, only the biggest and richest government agencies and corporations could afford networked computing systems. Networking technology was almost a religion, provided over by an elite class of technology professionals, and was able to command budgets that sometimes approached the gross national products of small countries.

But today, with the Internet as the basis of a new, lower-cost, universal global network, there is an immensely increased demand for networking solutions at every imaginable level of size, complexity and price. From the small electronic office market, through small business and medium businesses to the large-scale enterprise, networked information solutions are seen as key to business survival and prosperity. For IT resellers, selling and supporting network solutions is becoming as big a pay opportunity as selling PCs and printers to account sales and profits over the next decade.

Within the next 10 years, every aspect of life in

much of the developed world and a large part of the developing world will be permeated by low-cost, simple-to-use networking technology. Networking technology will not just be a part of traditional "big iron" computing, but also will, as part of the convergence of computers with traditional communications media, become intertwined with the consumer electronics industry, education, retailing, and many forms of entertainment and social interaction.

TCO And The Art Of Solution-Selling

The major barrier to the wider adoption of networking technology has always been its cost and complexity. The initial cost of hardware and software is only a small fraction of the real cost of a network to an end-user. The "real" costs — often hard to predict and to quantify in advance, include training, support, maintenance, customized software development, copyright clearance, security, data archiving, insurance, and infrastructure (including such things as modifications to buildings, climate control, electrical power supply lagoverment, network cabling and external telecom links). As well, consider the so-called "hair factor" — the time spent by employees fiddling with networked computer systems, trying to get them to work. All this adds up to the total cost of ownership (TCO) of a network.

In the past, many businesses that began to build PC-based networks started out as an

Some Players

IBM — <http://www.ibm.com>

IBM is still the biggest presence in network computing, its success in the early 1990s IBM approach led to later years the business computing market completely dominating the first five years in the U.S. The rise of the Microsoft/Novell personal computer and later the advent of the Internet, partly because IBM's share of the enterprise computer market.

However, IBM is still one of the most original innovators in networking technology. It points to fibre as LAN technology, which also has been a main source of its success. IBM is also a leader in electronic commerce solutions. Microsoft offerings are made computing systems. IBM has held a large share of its large enterprise computing customers, offering the high quality and reliability of its mainframe and AS/400 based systems as a counter to the more long of Windows NT. IBM also offers a lot of solutions, and has made a major contribution to the profit benefits of network, establishing a new and small business computing services in Canada.

Digital/Compaq — <http://www.compaq.com>, <http://www.digital.com>
Both are leaders of business computers and Digital Equipment Corp. (DEC) Compaq has become the second largest computer company in the world and the largest seller of PC/AT compatible systems in its line. Digital has also a large share of a number of networking components and services like and offers the widest range of products across the spectrum of file servers and other server computing, from desktop devices to network servers.

Compaq recently introduced a new global networking technology, well through to Digital and Digital is now a leader in developing new electronic commerce solutions.

Novell/Netware — <http://www.novell.com>

Novell is a diverse company, where computers are part of a product line that includes printers, servers, and has been a successful business. Novell's PC/AT architecture, designed for high performance networked systems, and its server, has been well received by Intel. Novell and DEC is a company that provides a solution, but with Novell's strategic alliance with Intel it is

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ed two minutes, adding individual computers as needed, or allowing departments to establish their own small LANs. Often, it was hard to measure the productivity of a network solution against its total cost, and when this was actually tried, the results were often lightning. Networked PCs turned out to be tremendously expensive.

Now customers are increasingly aware of the need to see networking as an integrated part of an enterprise's business plan. To be successful, resellers need to be able to present a business case for a network solution that offers the highest performance and productivity for the lowest TCO.

The Universal Standard That Just Happened: HTML And The World Wide Web

Another main reason for the high cost and complexity of networked computing was the proprietary nature of the various network solutions on the market. All of the major mainframe and workstation computer makers, such as IBM, Digital, Hewlett-Packard, Tandem, Sun and Silicon Graphics, developed their own proprietary hardware platforms and operating systems, imposing high interoperability costs on end-users. Even the Unix operating system, which was supposed to be an "open system" able to run the same software on multiple platforms, failed to retain this compatibility, fracturing into a host of incompatible "flavors" of Unix.

One brilliant idea made the whole sticky structure of proprietary, incompatible networking obsolete. A few very bright, noncommercial minds saw an opportunity in the Internet the basis for a truly open information network for all of humanity. The key element in changing the world of networking was the creation of HTML, the Hyper Text Markup Language. Created by Tim Berners-Lee and others, this was a text-based page description language, which could create electronic documents composed of text, pictures, sound, movies, or many other kinds of data. HTML documents could be viewed on any computer that had a browser program that could interpret HTML commands and display an HTML document on a computer screen. HTML's basic format was largely copied from a specialized electronic document language called SGML (Standardized General Markup Language).

However, the "hyper word" in the HTML acronym refers to the ability to link different computer files together, even if they are located on different computers, in different countries. For instance using HTML, a computer document dealing with Christopher Columbus can have an electronic button built into it which will let the interested reader jump to related documents on Spanish history, map-making, or the quest itself — even if these other documents are on another hard drive, on CD-ROM library, or another computer connected anywhere to the Internet.

The developers of HTML envisioned a literal "World Wide Web" of server computers linked via telephone lines and satellites, networks of end-users could locate and view information on any connected computer anywhere in the world, using a Web search engine database, a Web browser and the HTML language. The developers of HTML



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offered their idea to the world as a free gift, short-circuiting the otherwise inevitable tendency to develop incompatible, proprietary versions of HTML.

The result of this breakthrough was to do an end-run around proprietary computer operating systems and incompatible hardware and software and, seemingly overnight, to present the world with a completely new model of computing.

64-bit program, 64-bit data stream is necessary to use the FPGC processing technology and the associated cost.

1997 and he expected to vigorously push 1A-100 but it never happened because running South is never 100 but remains at 100 and 10000, starting in 1999.

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Figure 1. *Diagram illustrating the relationship between the variables in the model.*

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65-74	~65	~65
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85+	~85	~85



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The Re-Emergence Of Unix: IA-64, NT, And The Two-Way Tango

The biggest success story in the networking market in the last three years has been the rapid growth of Microsoft's Windows NT program. Although identical in user interface to the familiar Windows operating system, NT is a completely rewritten 32-bit operating system, with much greater security, scalability and ability to manage network computing than Windows 95.

Microsoft has also developed a range of Back Office applications, which grant NT the power and flexibility to be a viable business networking platform. Versions of Windows NT are available for Intel, DEC Alpha, PowerPC and MIPS platforms. With the recent purchase of DEC's Alpha technology

by Intel, it can be expected that NT will, in practice, be available solely on the Intel platform.

Aided by Digital Equipment's adoption of NT as an enterprise networking solution, Microsoft has gained the lion's share of new business in the networking market in recent years, especially in the small- to medium-sized networking field. The other major network operating system vendors, such as IBM and Sun, have watched their market shares decline (though with the rapid expansion of the networking market, they are still seeing some absolute growth).

The most striking development in high-power and business computing over the next few years is likely to be the introduction of Intel's new 64-bit processor technology, beginning in 1999.

compared to its products to dominate it. The next version of NT and Windows 2000 (probably within a longer still user interface) will certainly account for the majority of new sales software licenses being sold. The Microsoft Back Office line of products is currently enjoying the largest share of gains in network and database tools that can be done directly within Windows. Although much improvement of Windows NT remains to be done, results of recent development as well as sales growth is truly remarkable.

Intel — <http://www.intel.com>

An early leader in offering a refreshing 32-bit supported client/server computing, Intel helped turn the PC as a viable platform for network computing. However, some early management database tools on the purchase of Windward and an apparent Microsoft to the threat from Microsoft's Windows NT has led to a decline in Intel's market share.

Alpha — <http://www.alpha.com> (now a subsidiary of Compaq)

Alpha is a major international developer and manufacturer of networking hardware and software components. At the time of the article, Alpha was in a strong position to compete in the high-end market. It has a long history of networking hardware, including high-end routers and switches, and it has a long history of networking software, including high-end operating systems and network management software. Alpha is also a major player in the high-end market for networking hardware and software. It has a long history of networking hardware, including high-end routers and switches, and it has a long history of networking software, including high-end operating systems and network management software. Alpha is also a major player in the high-end market for networking hardware and software.

Enterprise Technology Co. — <http://www.etc.com>

Founded in 1987, Enterprise Technology Company quickly became one of the most successful makers of network interface cards, but since 1992, has also

likely to be the introduction of Intel's new 64-bit processor technology, beginning in 1999.

1A-44, a much more powerful family of silicon chips, is based on a strategic technology alliance between Intel and Hewlett-Packard.

The new chips will be able to run older 32-bit Windows and Windows NT programs at reasonable speeds, but they are really designed to run a new, 64-bit version of Windows NT and 64-bit applications programs. They are also designed to run Unix, IA-64 will put Unix and NT head-to-head on the same computing platform, a platform with enough power to be used for all but the most demanding of enterprise computing tasks.

Sun, IBM, HP and Silicon Graphics have all announced support for IA-64, so all the flavors of Unix will have to settle on the same playing field with Microsoft. This could mean a showdown between Windows and Unix for the bulk-end of networked computing.

NT is still notoriously weak in terms of its security and reliability features compared to Unix (a fact that Unix vendor SCO has exploited in becoming the leader in Unix server solutions on Intel-based computers). By late 1996, a battle royal will be shaping up, as NT and Unix wage what may be the last battle in the operating system wars.

For the time being, companies such as Compaq and IBM, which have both NT and Unix server offerings, seem it's not a matter of NT or Unix — but NT and Unix, according to customers' individual needs.

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A Little Knowledge Is A Dangerous Thing

The first story is a cautionary tale for both product manufacturers and resellers. It was obvious that the TCO of the average networked Windows computer was too high, so an alternative model (Network Computer, running Java applets from a centrally managed server) made a certain amount of sense. However, one has to conclude that the senior management of Sun and Oracle never really understood why people bother with PCs in the first place. These reasons are flexibility, local control, and a huge choice of good software.

It makes as much sense, at least in the short term, to add better connectivity and management to the PC as lower its cost of operation, rather than to throw the whole thing out and start over again with an all-Java solution. In particular, the lack of support, compelling Java business software is a major impediment to the believability of the Java business model. IBM may be able to find some gold in Java territory, but it was effort to offer Java/NC solutions as part of its wide spectrum of networking options. If Java doesn't become the next big thing, Big Blue will get over it.

How To Get Good At Selling To The Networking Market

Steady new customers' needs. In particular, this means getting to know the small to medium business networking market. The phrase "The network is the computer" really does apply to a business network of any size of the solution fails, the entire company is in trouble. This means that the model for reseller success is different than in the price-sensitive consumer PC market.

The most reliable, manageable solution is much preferable to the cheapest. Resellers should avoid selling networking components they're not familiar with into computer installation. Retailers should take priority over bargains, and part of the cost of selling will be in training and keeping technically competent staff.

Follow The Money

In particular, qualify the potential networking solution customer to determine how experienced and realistic they are. There is a certain minimum cost of establishing and maintaining a networked PC system. If the customer is resistant to a realistic quotation, it might be better to let that business opportunity go and find another customer.

The Future

In 10 years, while some aspects of networked computing will still be recognizably similar

to what they are today, many others will be very different. There will still be a need for servers; devices that combine mass data storage with the physical equipment for managing access to data over telecomm networks. Network bandwidth will be enormous, with the possibility of much increased



satellite and wireless networks supplementing fibre-optic lines.

The average home should have at least an option for several megabits per second in download speed. Businesses will have the option of local network speeds in the megabit per second range. The biggest changes are likely to come in terms of end-user devices. The personal computer may not exist as we've come to understand it over the last 20 years. At the very least, a large number of personal info appliances will be reduced to highly portable form factors (pocket or credit-card-sized PCs with telephone and TV functions), or embedded in TV sets, phones, cars and other machinery, toys or furniture.

Even where something resembling a desktop workstation remains, most of its bulk is likely to consist of a video screen, sound system, and input and output devices (such as telephones,

microphone, speakers and printer).

For resellers, the more complex and costly networking solutions become, the more technically challenging they will be for resellers to handle, but there will also be more opportunity for maintaining decent margins for consulting, system integration, training and support. The cheapest and more automated networking businesses, the largest potential market, with fewer demands on the reseller for high technical skills, and lower profit margins all around. □

Jeff Evans is associate editor of Canadian Computer Wholesaler. He is based in Toronto and can be reached at jef@nsp.com.

plant's location as a designer and manufacturer of high quality networked, integrated and storage products. The company offers a well rounded line of products and supporting solutions, consultancy and periodic products. Computer makes last. Storage solutions come, as well as. Then they networked storage products.

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Networks makes switched, routing products that are used in a wide range of applications. The company offers a well rounded line of products and supporting solutions, consultancy and periodic products.

Network has recently expanded their range of products to build networking solutions for home, which include a range of products available in one of the most successful markets for networking in Canada.

Powerline — <http://www.powerline.com> or <http://www.powerline.com/infocenter>
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Secure — <http://www.secure.com>
Secure is a leader in networked hardware, including some of the earliest and most successful networked hardware. Secure PC Cards. Current products include the RealPort Ethernet 10/100-Mbps and 10/100-Mbps PC Card with built-in connector system.

Link — <http://www.link.com>
Link for Linux is a driver running on any of the company's which has been an important in both technology and marketing in the network hardware market. Link is currently selling its "Link" and other products, allowing customers to purchase Link products from a wide range of vendors, while making no payments for the Link.

Link products are available from a wide range of vendors, while making no payments for the Link.

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Secure — <http://www.secure.com>
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Distribution: *A precarious proposition?*

by Paul Weinberg

The so-called "channel" is highly competitive, fraught with shipping margins and conflict.

The distribution piece of the equation is certainly no exception. Much of the PC industry has come to rely on distribution as a middle layer for the storage and delivery of computer products and parts from the manufacturer to the reseller in a timely fashion. Moreover, the distributors handle the most rules and the necessary credit checks on the purchases. All of this requires an infrastructure and expertise — which distributors have established. "This is their core competency," said Debra Brewer, IBM's manager of advanced fulfillment initiatives.

U.S. and Asian-based PC manufacturers rely on local distributors to represent their interests in a vast, dispersed and fragmented Canadian market, made up of thousands of large and small resellers and retailers, which in turn rely on that middle layer to source products for customers.

Yet, as consultant Bob Prechard, president of Kingston, Ontario R. J. Prechard & Associates, notes, "There continues to be a cloud on the horizon." The instability of distributors to generate demand for vendors' products in the channels "puts them on a disadvantage and limits their scope," he says. And Prechard is among industry commentators who forecast diminishing returns from software sales for distributors as more end-users start making their purchases of applications over the Internet.

Vendors are bypassing the distributors usually (and often the resellers too) by shipping their systems bundled with many of the standard packages. "You can specify routers, fees and vendors right down to the application package (including) word processing and accounting," Prechard says.

The latest summary numbers on the computing distribution channel in this country from Toronto-based International Data Corp. (Canada) Ltd. represent Canadian distribution in 1996. At that time, distributors experienced growth of 31 per cent, exceeding a trend of outpacing the rest of the information technology industry in Canada, and total revenues in the same year were about \$4.7 billion. Also, seven companies accounted

"It is a much more competitive market. We had margins of 22 per cent in 1989, but there was a smaller base of products and lower sales."

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"I can buy a Compaq machine from a distributor at a point-and-a-half margin... which is not much more than what I would have to pay Compaq."

— Len Cator

for more than 70 per cent of the revenues derived from the distribution of computer products. Ingram Micro Inc. (Canada), with its Indian dollars in revenue, is the largest player, followed by other broad-line distributors such as Menard Canada Inc., Globelec and Tech Data Canada Inc., and more specialized companies like BMI Data Systems Ltd., Hemisphere Canada Inc. and Sagecom.

According to the IDC report, distribution showed 27 per cent of revenues, from peripherals and components (such as mass storage, monitors, motherboards, sound cards and memory products), compared to 24 per cent for desktops, notebooks and servers, 23 per cent for software, 14 per cent for data communications products, eight per cent for printers, three per cent for systems and workstations and one per cent for services.

The IDC survey indicates a small shift away from PC sales for distribution that could be more pronounced in the late '90s in all the major PC vendors (IBM, Compaq, Dell and Hewlett-Packard) continue to set prices for their machines. "The \$1,000 PC is definitely here," says Albert Doucet, director of special projects at the Electronics, Ont.-based Evans Research Corp., which is currently undertaking a study of Canadian PC distributors.

Doucet says in addition to losing most money on PCs, distributors are also facing lower margins or markups on products determined through market pressures. "On some major brands over five years it has gone down from 12 per cent to two or three per cent."

Even at IBM Canada counters that lower assembly costs achieved from the adoption of a build-to-order channel assembly program with its distributor and reseller partners should attenuate the impact of lower margins. One strategy being adopted to accomplish this, she says, is having distributors maintain their position as the collector of receivables, and the guardian of credit checks, while the manufacturer ships the products directly from its Mississauga, Ont., assembly facility to either the reseller or end user.

But Len Cator, vice-president of operations for the Mississauga, Ont.-based national mailer chain, GE Capital Technology Management Services (Canada), says that the current price war among vendors has led to a flood of PCs inundating into the market and thus undermining the goal of limiting inventory at the channels. He also wonders how distributors are able to make any money in the current situation. "They are doing well on the top line, but not on the bottom line. I can buy a Compaq machine from a distributor at a point-and-a-half margin... which is not much more than what I would have to pay

RESELLERS

Compaq [directly]."

Meanwhile for Mary Whittle, vice-president of marketing for Weston, Ont.-based Ingram Micro Canada Inc., reduced margins have been "a fact of life" for the past 10 years. "It is a much more competitive market. We had margins of 22 per cent in 1988, but there was a smaller base of products and lower sales."

Whittle also said increased PC sales always outweigh the revenue lost in lower prices. She says that PCs are now an 44 per cent of Canadian households and that businesses are still buying systems to meet their requirements.

Sean CFM, president of Mississauga, Ont.-based Service Dimensions, suggests the market has reached a stage of saturation where those consumers who either want and can afford a complete hardware/software system have already made the purchase.

Furthermore, distributors lost revenue with fewer PC hardware brands seeking the attention of end-users, a development that started with software, suggests Doucet. He reports that the top three manufacturers — IBM, Compaq and HP — increased their share of the PC market from 31 per cent in 1996 to 44 per cent in the last quarter of 1997. The manufacturers go beyond low sales, however. "As the number of brands consolidates, the distributors have less negotiating power with vendors," he says.

The IDC survey also demonstrated a trend towards greater revenues for distributors on the sale of third-party components and peripherals to resellers.

But Doucet says he's noticed fewer of these items going through the distribution channel. Instead, the vendors are adding them to their machines in their factories outside Canada, he says.

Cator figures that "year-by-year decrease in component flow" may be reversed with the involvement of the major distributors in configuration services and vendor build-to-order channel assembly programs — the latter is still going off the ground.



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Distributor Revenues in Canada, 1994-1997 (\$ millions)



Source: IDC Canada

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But Tony Oliver, IDC Canada's manager for Canadian channel research, doubts that the high volume, broad-based distributors like Marshall have the resources, expertise or business model to take on many such advanced systems. He notes, for instance, that when IBM decided to base its AS/400 machine sold through the channels, it did

The Canadian distribution channel has witnessed considerable consolidation of the main players and the disappearance of smaller companies. This middle layer in the PC industry has been forced to be as efficient as possible. Hence, the adoption of on-line ordering and electronic catalogues, for instance, which saves time on the telephone for their sales



Paul Hestberg is a Toronto-based journalist who specializes in high-technology reporting. He can be reached at phestberg@attitude.com.

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The State of Distribution

By Mary Whittle



The distribution service industry has reached a stage of maturity.

Maturity comes with all the expected challenges and opportunities. For example, the shortening of the distribution channel in Canada occurs a broad, easily accessible assortment of technology products. For manufacturers, channels abound through which to sell their products. For the distributors themselves, this creates a highly competitive market place that demands efficiency and low-cost operations. Therein lie the challenges.

Throughout the channel, profitability among the players has weakened. But this weakness translates to big business for the partners who can provide the highest level of service for the most competitive price.

Retailers search for efficiency gains and increasingly rely on distribution to be their inventory managers on a "just-in-time" basis. Since distributors' operations are now so efficient, same-day turnaround for these orders is typical.

Manufacturers constantly strive to take costs out of their business so they pass these costs associated with "getting the products to market" to their distribution partners. For those vendors, it is typically cheaper to let distributors handle the costs of account management, reseller communication and credit services. This has translated into more business for distributors from non-traditional technology sectors. The high-end main-frame computers, many based in the U.S., operating systems environments, are increasingly sold through the two-tier distribution channel rather than from the manufacturer directly to the reseller or end-user.

And 1997 witnessed the entrance of the telecommunications industry into what had traditionally been known as the computer reseller channel. The convergence of data and voice transmission is causing computer resellers to enter the telecommunications area and telecom resellers to enhance their business in the computer networking environment.

Simplification of processes and systems is a critical success requirement in the channel. It is important for the channel to recognize its value and to streamline product acquisition for the end-user. The advent of channel assembly demonstrates this perfectly. Manufacturers understand their strengths — they're good at designing computer systems and sourcing the components. But is there any value in pre-assemblying the box? How do they know that customers will want that exact configuration? Does it make more sense for assembly to be closer to the ultimate customers who can then order a custom-designed system?

Retailers understand that they are the agents to help the ultimate customer comprehend the benefits of the technology installation, recommend, source and train the end-user on the system's capabilities. But is there any real value in "value driven" changes in the pre-assembled systems? Might there be cost savings by placing responsibility for just in time delivery of custom configuration into the hands of the distributors?

The role of distributors is to have the products available when

needed, and be able to deliver in 24 hours. Giving more of the responsibility for tactical execution-type processes to the channel partners that have demonstrated such focus on efficient operations seems to be the natural course. Channel assembly is a very large opportunity for distributors.

The Internet may be one of the greatest opportunities in distribution's continuous pursuit for efficiency. Web-based service allows resellers to search for products that will fulfill their customers' requirements, check pricing, availability, even product specifications, and then place the order electronically. Once put in the system, resellers can check the stage of the order's progression through the Web as well. Not only does this allow the customer access to thousands of products, these transactions can be taking place 24 hours a day, seven days per week.

Over the last 20 years, the growth of the industry has been spectacular. Often manufacturers could not design and build products fast enough to meet the demand. That caused players throughout the industry to operate in a reactive mode.

In the most mature industry, issues of "brand" supremacy are discussed among the manufacturers. Distributors are increasingly being called upon to help establish brand identity for manufacturers and resellers alike.

Manufacturers and resellers need to make technology more consumer-friendly as computers and peripherals become mainstream commodities.

For distribution — the road ahead houses some potholes, like decreasing profitability and consolidation of suppliers. But it's full of new roads to adapt to, and endless opportunity. □

Mary Whittle is the vice-president of marketing at Toronto-based Ingram Micro Inc. (Canada).



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by Sean Connolly

"Photographic-quality prints go through ink like a vampire at a blood bank, and require costly special photo printing paper."

A retailer's best chance to succeed with ink-jet printers will come in a crowded market is to ensure that you're not buying the printer when you give the free value for their own ink. Since many consumers are confused about the relative benefits of jet versus laser printers, retailers need to be prepared to address issues. So, what are the advantages of the ink-jet printers currently on the market, compared to laser? Who would best benefit from ink-technology?

Over the past couple of years, ink-jet printers have improved immensely — to the point where they now represent more than 35 per cent of printers sold to home PC users, and an increasing share of the direct printer market. Previously ink-jets were only marginally better print quality than the dot-matrix printer, and much slower than laser dot-matrix or laser. Recent advances in ink-jet technology now allow the user to print test documents at a quality that is nearly indistinguishable from laser output. In addition, the output resolution on newer models has improved so much that protocols of images (actual-sizeable photographic prints instead of the heavily-pixelated and too-small output of yore).

High-quality color output doesn't come without a cost, however. While documents with more touches of color are generally easy on the eyes, colorjet, photographic-quality prints go through ink like a vampire at a blood bank, and require costly special photo printing paper, with the cost of ink cartridges and other supplies factored in, the print-

ing cost for high-volume ink-jet printers can equal or even exceed the cost of the hardware itself before testing. In fact, some ink-jet users refer to low cost ink-jet printers as "cheap traps," priced in to lure buyers. Once the customer is hooked in by buying the hardware, the major profit opportunity for manufacturers and retailer is in feeding the demand for ink and supplies.

As for speed, laser printers don't have anything to worry about just yet, but page-per-minute (ppm) ratings for both draft and high-quality output are climbing steadily. Depending on the ink-jet model, high-quality full-page full-color output can take anywhere from 15 to 30 minutes. High-quality black and white is much speedier, one to two minutes per page.

What does this all add up to?

For the end-user who will need to print a lot of high-quality black-and-white output, laser printing would certainly seem to have the edge, in terms of reliability, overall cost and output quality. Done with color laser printers, for users who need consistent and quick printing on higher volumes, and aren't overly concerned with the initial printer cost.

But for the average user, who will be using a printer for low-volume, and yet high-quality output, for occasional splashes of color, and for just plain fun, the ink-jet makes a compelling case. This would seem to indicate that the ink-jet printer will continue to rule the roost in the

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retail market for the foreseeable future. The ink-jet can also be the perfect addition to a small office that requires occasional near-photo-quality color output, without breaking the bank.

The Contenders

For this month's Lab Test, we asked the manufacturers to supply one color ink-jet printer, with the focus being on the personal or home office user, and the cost roughly \$300 or less. This is the "sweet spot" of the consumer and small office ink-jet market, the range where most of the business is to be done. High-end color printers, which have to accommodate professional needs for PostScript compatibility, color correction and extendability, carry a much higher sticker price, and are of interest to a much smaller market.

The Tests

To measure print quality, we printed a page of text onto normal bond paper in highest quality mode using Microsoft Word, and a high-resolution photograph onto glossy photo paper. For color accuracy, we printed and compared a pair of pictures on both regular bond paper and glossy paper. We also printed a set of test graphics, consisting of solid black rectangles, black gradients and color bars. All tests were done in the Windows 95 environment, using the drivers provided by the manufacturers.

Speed: Reality Checks

Manufacturers often use different criteria to determine their machine's maximum-rated draft speed. What this means is one manufacturer may be using a test sheet with a few lines of text on it, and another manufacturer's test sheet may have a few more lines. To even up the odds, we took one average page from Microsoft Word (with text from top to bottom) and averaged the page per minute speed over three minutes. Consequently, our results are slower than the manufacturers' draft ratings, but we feel that they more accurately represent the actual speed that will be achieved by the typical user under real-world conditions.

Cartridge Comparisons

One of the problems with earlier color ink-jet printers was the cartridges: many machines allowed the user to load either the black cartridge or the color cartridge, but not both at the same time. In fact, some ink-jets since 1992 to 1994 could only create "black" on a color page by overprinting all three primary colors to create a wet, blurry dark brown tint. Thankfully, all of the models in this month's showcase accept black and color cartridges simultaneously.

This means fewer hassles for the user, with less cartridge switching between jobs. It also means more efficient color printing, as black text should come from the black cartridge instead of consuming substantially more color ink to achieve the same effect. And, of course, black is really black.

Another problem, which hasn't been entirely solved by any of the models in this month's test, is color dithering, (an approximation of a color, using available colors.) Test bars on one of our test sheets featured a dark red solid color, surrounded by a dithered, lighter shade. Without exception, all of the printers represented the lighter color as darker because of the dithering. The good news is that this didn't seem to affect most of the things we printed, the bulk being mostly photography and text. Similarly, unless the printer is to be used as a serious tool for graphics arts and desktop publishing, this shouldn't pose a major problem in the end user.

One Final Note:

Retailers should be aware that the ink-jet printer product category is undergoing an astonishing rate of new product introduction in 1995.

Epson has announced as will announce no fewer than 13 new ink-jet printer models this year, covering the spectrum from entry-level bargain-priced models to high-end graphic arts press production HP, Lexmark and Canon are also moving to replace their former best-selling models with much-improved new ones. The quest for single quality, print speed, and to a lesser extent, lower cost of supplies, is driving a rapid turnover to the products available for sale. Be very wary about getting stuck with inventory of old printer models, as they may be hard to move, at any price, in competition with the latest and greatest that the major manufacturers will have to offer.

As well, the major opportunity for profit, once the hardware sale is made, will continue to be in supplies. Retailers should be more cautious about carrying "off brand" ink cartridges than they are about refilled laser printer toner cartridges. Ink-jet ink formulation is a much trickier business than laser toner refilling. Check out any discount name-brand ink-jet cartridge supplier very carefully before offering their products. When in doubt, you might do well to stick to the name brands.

Epson Stylus Color 800

Suggested Retail Price: \$579

Street Price: \$489

Epson is keeping up its high standards with the Stylus Color 800 model. With 128 nozzles for black ink, and 64 nozzles for each of the three colors, the 800 is able to provide a top resolution of 1,440 by 720 dpi. Text in both black and color is very crisp, and is virtually indistinguishable from laser on premium grade paper.

Color accuracy with the 800 was quite good, even on standard bond paper, although most colors printed a shade darker than the source graphics. Blacks were solid and black scaling was distinct. Using glossy photo-quality paper, the Epson shines, providing realistic photo-quality output with a minimum of blocky mosaic texture on solid colors.

Speed for high-quality output was average, at about two minutes per full sheet of text. The draft speed was reasonably good at five full pages per minute, but more impressive was the quality of draft output. Every 12 seconds or so, the 800 pumped out a sheet with good solid black text which would have been top notch quality on earlier models.

At 18.7 by 24 by 12.4 inches, the 800 is one of the largest printers, and is quite sturdy. Cartridge and paper loading are both straightforward. And for Macintosh users, this printer is the only one with the Mac Serial II interface.

As a bonus, the 800 ships with the Epson Productivity Kit, which comes with a

bundle of premium paper, Avery LabelPro 110 Software for Word/NT, Avery SmartLabel Projet Canon, and the Epson Answers Interactive CD-ROM. The 800 is covered by a facility two-year warranty.





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Canon BJC-4300*Suggested Retail Price \$329**Street Price \$295*

Although Canon has a newer machine near the upper end of our specified price range, it wasn't scheduled for release before press time. Instead we have the BJC-4300, which is aimed more at the consumer with a tighter budget. The unit has a top resolution of 720 by 360 dpi for both black and color printing.

Like all the other units, the BJC-4300 supports both black and color cartridges at the same time. One slight concern with this unit is the quality of black monochrome print while using the combination black/color cartridge. Printing a combination of black and color text provides slightly better black quality. A straight black cartridge is available for the 4300, which would provide better black text in monochrome mode.

With black cartridges running at \$44.95, it can become a bit expensive. It's also a bit of a hassle if the user has to continuously switch off cartridges to obtain optimum print quality. Luckily, the combination color/black cartridge is essentially the print head with two little ink containers, which can be and initially replaced for less cost, at \$12.90 for black and \$25 for the color container.

Color accuracy was reasonably good, with excellent reds and slightly dark blues. Black was a little spotty using the color cartridge, with almost no differentiation between shades of black. Color photographic reproduction was good, with a bit of spotting. Printing on glossy paper provided even better results.

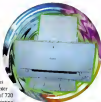
On the down side, print speed was a bit slow, and black draft resolution suffered from the same problem as high-quality black because of the color cartridge. Once again, color draft printing was better.

The printer is rather compact, with the paper output tray sliding in readily under the unit when not in use. The carriage switching system is also quite nice, as opposed to software control or a non-obvious button; there's a dedicated "cartridge" button inside the loading area.

One feature of the BJC-4300 that sets it apart is the ability of the printer to be quickly converted into a 360 dpi form-feed scanner. The optional IS-23 scanner package has a scanning cartridge (which fits into the same slot as the regular ink cartridge), scanning software and carrier sheets. Cleared, dedicated flatbed scanners can now be purchased for \$200 or less, but if space is really at a premium on the desktop, this is a fairly inexpensive solution, at \$446 suggested retail (about \$150 on the street).

Although a market leader in terms of print technology and speed, the BJC-4300 is extremely popular, and widely distributed as part of home PC bundles by a number of mass retailers. It is easy for even a novice PC user to set up and use, and its slower speed is only apparent when it is being operated next to a faster printer—not a typical situation in the average home PC setup.

The warranty period for the BJC-4300 is one year.

**Hewlett-Packard DeskJet 890Cxi***Suggested Retail Price \$249*

Another one of the standard-bearers in the ink-jet printer field, Hewlett-Packard checks in with the DeskJet 890Cxi model. Listed as a "Professional" model, the unit's price is on the higher end of the scale for this roundup, but is still a viable choice for the personal or small office user.

Certainly, the 890Cxi has a lot going for it. Of all the units tested, it has the most accurate color reproduction. There was a patch of crimson on one of the test pages, but where most of the other units turned it into a muddy brown color, the HP reproduced it with no problem. All of the other colors were accurate as well.

Gray-scaling was handled well, providing distinct shading. One problem we ran into was print-head alignment on solid patches, which caused a striping effect on patches of black (and occasionally on larger patches of color, but not as noticeably).

Photographic reproduction was excellent apart from raster striping, which mostly disappeared when using glossy paper. Text quality was also excellent, providing near-laser-quality text with a minimum of bleeding.

With 6.5 pages per minute of high-quality black draft output, the HP is without question the speediest of the printers. Even at the highest-quality setting, it zipped through the sheets at a rapid-fire manner. If speed is an issue, this is certainly the printer to get. Unfortunately, the unit is also the noisiest of the bunch, with occasional loud grinding and whining, which could be distracting in a quiet setting.

The warranty period for the DeskJet 890Cxi is one year.



Okidata Okjet 2020**Suggested Retail Price:** \$149**Street Price:** \$179

The Okidata Okjet 2020 is a bit of a good news/bad news situation, with the good thankfully outweighing the bad. Good news first.

Like the NEC and Canon models, the Okjet is more for the budget-conscious consumer, coming in at under \$150. In addition to the complimentary copy of Brotherband Print Shop, this compact and solidly built machine is backed up with a two-year warranty.

The meat part of the package, however, is the configuration of the print-head and cartridge system. With many printers, there is one black cartridge and one color cartridge. The problem is that the colors rarely get used in the same proportions, but the cartridges cease to function properly when any one of the colors run out. What this means is that when the cartridge runs out of cyan ink, users may be throwing out a nearly full section of magenta, or yellow. The Okjet uses the approach of splitting the three colors into separate cartridges, and making the print-head easily accessible and removable for quick and efficient individual cartridge changes.

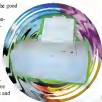
The Okjet is also good at reproducing colors, although some of the shades come out a bit darker than the originals (a common problem, it seems). Black patches print nice and solid.

The bad news? The black patches print as a bit too solidly. A grayscale test showed little distinction between such gradient from 90 per cent through 99 per cent black coverage. What this means is good snap text, but expect a lot of blackness in darker areas when printing photographs or graphics with subtle contrast variations. Color photographs looked okay, although there is definitely room for improvement in this area.

The second problem is the speed. The Okjet is the slowest of the bunch, clocking in at a very slow two pages of black text per minute in draft, and taking up to 30 minutes for a full page of full color.

The last problem is one of compatibility. The Okjet software drivers were a bit picky about the environment the printer was running in; the printer didn't work properly until all other printer drivers were removed from the system. For most home users, this shouldn't pose too much of a problem, but for users who want to have more than one printer installed at the same time, it could cause a few headaches.

That said, the printer is a good low-cost alternative, as long as subtle shades of grey aren't a major concern to the user. With the longer two-year warranty, and the ability to replace individual colors instead of the whole color cartridge (and consequently at a lower cost to users who use more cyan than magenta, for example), serious users may end up much further ahead with this unit.



Ch-Ch-Changes

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NEC Sa. SuperScript 150C

Suggested Retail Price: \$255

May 96

Although reasonably new to the ink-jet market, NEC comes to solidity with the sleek-looking SuperScript 150C, which is a great choice for the budget-conscious user. At 600 by 600 dpi, the machine doesn't have the best resolution of the machines tested, nor is the 150C particularly speedy.

However, coming in at about half the price of the higher-priced printers in this lab, a bit of a trade-off in these areas is to be expected.

Text quality was generally good, but began to falter on smaller font sizes. This was especially true on lower quality paper, where it produced a lot of speckling on both black and color text. Full-color photo-quality printing produced speckling and blocky areas in places, although use of glossy photo-quality paper produced much better results. Color accuracy was fair to good, generally coming in a bit darker than the source material.

Solid black and grayscale graphics were handled surprisingly well. Part of the reason for this could be the cartridge configuration. Rather than a black cartridge and a second three-color cartridge, the 150C adds a "graphic black" to the color cartridge, which helps to better blend the color with the regular black.

Speed was generally good on high-quality jobs, but the draft was a bit disappointing. Color came in at 2 ppm, but black only came in at a slightly better 3 ppm. This wouldn't be quite so disappointing if the quality of the draft were better; while other units provided fairly good-quality draft, the 150C's draft text appeared more like dot-matrix output.

The unit is in the middle of the weight range, but has a pretty large footprint at 18.11 by 18.30 by 9.29 inches. It appears a bit more fragile than most of the other printers — users with small children should beware, especially of the slightly flimsy loading door on top. (Side note: The visual instructions on the inside of that door for setting up the text and midweight cartridges are baffling, but thankfully also appear as an understandable text form on the manual.)

If the 150C's low price isn't enough to grab the customer, the printer also comes with the Broadband Print Shop CD-ROM, a Season Street Art Workshop CD-ROM, and an NEC Media Sampler Pak.

The SuperScript 150C is backed up by a one-year warranty.



Lexmark 3700

Suggested Retail Price: \$409

Street Price: \$399

May 96



Lexmark raises the resolution bar a bit with the 3700, offering a full 1,200 dpi in both directions.

This means a coverage capability of 1.44 million dots per square inch, as opposed to 1.04 million from Epson's Stylus 800. In addition, the 3700 features a nifty little innovation in the paper feeding mechanism, which automatically adjusts for overly thick paper, without manual intervention.

Another nice feature of the 3700 is the size of the unit. While not as slim, the paper-receiving tray slides right into the underside of the machine, bringing it to less than eight inches deep. When desk space is at a premium, this becomes a huge plus for such a high-quality printer. And at just six-and-a-half pounds, it's the lightest of the pack.

Despite that, the 3700 isn't a lightweight when it comes to print quality. Both black and color text are extremely sharp, even at very small font sizes. Except for very minor bleeding when printing on plain bond paper, the quality is comparable with a laser printer. Draft speed is quite good, and draft quality is excellent.

Color accuracy was good, although distinction between grayscale gradients was only fair. Photographs reproduction was very good with the black and color cartridges, although there were blocky sections in areas with solid coloring. Switching black with the optional photo cartridge improved this even further, providing the best photo-quality reproduction of the batch of printers.

Considering the performance of the machine, the \$399 price tag is even more impressive. The package also includes the Lexmark Workshop CD-ROM, which has photo editing software, proofing card and T-shirt creation software, and more.

The big drawback: At nearly \$30 a page, the ink cartridges are expensive when it comes time to replace them. The good news is that they last a long time (during our tests we printed out quite a few full-color pages, and the ink levels changed only marginally during that time).

The 3700 comes with a one-year warranty.



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Ink-Jet Printers

Canon iBJC-4200

Epson Stylus 890

Hewlett-Packard 890Cxi

Printer type

Thermal ink-jet

Maximum resolution (dpi)

Resolution (horizontal)

Print speed (ppm) (text)

Maximum yield

Print volume (pages)

Maximum print

Maximum print

Maximum print

Maximum print

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Bubble jet

720 x 360

64 black, 24 color

2

1.5

2.4

2

4

Micro Piezo

1,440 x 320

128 black, 192 color

7

5

8

5

4

Thermal ink-jet

600 x 600 black, 300 x 300 color

300 black, 192 color

5

4

9

6.5

4

1 color, 1 black (in grayscale)

Win 3.1, 95

Parallel

1 color, 1 black

Win 3.1, 95, NT, Mac

Parallel, Mac

1 color, 1 black

Win 3.1, 95, NT

Parallel

3.5

75.0 x 50.0 x 8.0

45.0 (A)

14.5

16.7 x 24.8 x 12.4

45.0 (A)

14.5

17.5 x 15.6 x 8.9

50.0 (A)

yes

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LAP TEST



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Lexmark 5700

NEC SuperScript 750C

Okidata Okijet 3020



Thermal ink-jet	8-in/4-in jet	Thermal ink-jet
1,200 x 1,200	600 x 600	600 x 600
200 black, 180 color	60 black, 67 color	48 black, 72 color
1	2	1
3.5	2	1
4	6	4
5.5	3	3
up to 6	5	4

1 color, 1 black	1 color, 1 black	1 black, 1 cyan, 1 magenta, 1 yellow
Win3.1, OS, HP	Win 3.1, OS	Win3.1, OS, DOS
Parallel	Parallel	Parallel

8.5	10	10
17.0 x 6.0 x 6.0	18.71 x 10.30 x 9.25	15.37 x 11.75 x 7.62
47 dB(A)	48 dB	46 dB(A)

yes	yes	yes
yes	yes	yes
yes	yes	yes
yes	yes	yes
yes	yes	yes
yes	yes	yes
yes	yes	yes
yes	yes	yes
yes	yes	yes
yes	yes	yes

\$439	N/A	\$249
\$399	\$155	\$279

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Editors' Choice

One important thing we realized after conducting the tests: Every single one of these machines provides rather impressive results, and differences between each model's output are, in large part, subjective. All of the printers produce photographic results that are appreciable. That said, the following are our picks:

Price/Performance

NEC SuperScript 750C

For the budget-minded buyer, the NEC gets the nod for economical, color reproduction and good-quality black text at highest-quality output.

Overall

Lexmark 5700

For the combination of sharpest text and best photo quality, Lexmark edges out the Epson, especially with its compact size and lower price. **B**

Who Will Save Desktop Publishing

By Geoff Wheelerwright

The traditional developers of desktop publishing software are seeing unrelenting competition from entry-level packages, word processors and Web design tools. Positioning is the name of the game.

Desktop publishing isn't what it used to be.

Paul Brainerd, the founder of Aldus Corp. (which originally produced PageMaker before Aldus was sold to Adobe), used to say desktop publishing was the application that "saved the Macintosh" back in the mid-1980s.

These days, however, it has more than enough work to do in surviving itself.

It's an ironic state of affairs. Desktop publishing has actually come full circle from its humble origins — and completely changed the software industry in the process. What started out as a specialist application that appealed to a small, enthusiastic breed of creative users morphed into something that could be used as a publication design tool by millions.

Market Shifts

Just when desktop publishing was starting to gain huge popularity as the best kind of tool for designing professional-looking publications, two things happened. The first was that word-processing software began to take on many of the features typically found in desktop publishing applications — including, for example, the ability to handle tables, flow text around graphics and put text in columns. The second major catalyst from the success of desktop publishing was that a second tier of "entry-level" applications emerged and scooped up most of the volume in the market. While many would argue that this consumer-style product was actually a key element of the market from the outset of desktop publishing, there is no doubt that basic, easy-to-use, sub-\$100 tools such as Microsoft Publisher have captured the lion's share

of the publishing applications market by unit volume.

With the recent launch of Publisher 98 and Microsoft Office 97 Small Business Edition, Version 2.0 (which includes Publisher 98), Microsoft Canada's general manager Simon Wiles says the trend is likely only in academic. Microsoft is now focusing more of its energy on winning the hearts and minds of small businesses, a segment in which he admits Microsoft has not been as successful as he would like. "The big we haven't done is gotten to the end-user and driven demand," he said. "We need to rely on our reseller relationships and drive [our message] down to customers."

The Web Factor

Desktop publishing vendors have also had another major market force to contend with — the advent of the World Wide Web. Increasingly, many small businesses are using the Web as vehicle for "electronic" versions of flyers, newsletters and brochures, and desktop publishing applications are not necessarily the tools they use to accomplish this. Web design applications are likely to scoop up some of the market that would otherwise have gone to desktop publishing software.

A recent report by International Data Corp. clearly illustrates the strength of this trend. At the end of March, IDC released a report suggesting that the tremendous growth surrounding the Web — specifically the number of sites created and the number of users accessing those sites — has resulted in "a dynamic high-growth opportunity" for Web authoring and design software.

According to the report, Web authoring and design revenues worldwide will reach more than US\$290 million by 2002. IDC forecasts that the Windows market for Web authoring products will increase at a compounded annual growth rate of 53.6 per cent for unit shipments worldwide between 1993 and 2002.

"Publishing content on the Web continues to explode and is increasingly becoming more complex as competition grows unabated," said Joan Carol Brigham, a research manager in IDC's Internet program. "Because standards such as HTML prevail, vendors are finding more creative ways to compete aside from pure features through ease of use, added peripheral features, such as ISP hosting services for Web sites, and application interfaces."

The IDC study further suggested that products such as NetObjects' Team Fusion are addressing the needs of the group while MacroMedia's DreamWeaver and Colson's CyberStudio are targeting the creative designer. NetObjects is also striving to become the preeminent front-end for Web application development, stated the report.

The IDC study revealed just how much of a shift in the vendor leadership "pocket order" this change is posing. "Microsoft has played a sizable role in shaping the general landscape. Many companies have felt the aggression of Microsoft each time the

company releases a new beta version of FrontPage," concluded the report. "Additionally, as the company continues to bundle FrontPage with the NT server product [IDC found 50 percent of NT server installations are active users of FrontPage], Microsoft's market share grows significantly."

The study also suggested that some traditional desktop publishing companies have misjudged this market and are suffering for it. "Regardless of Microsoft, there have been some serious false starts in this market, including Interleaf's promised CyberLeaf product and Quark's Inroads, which missed the HTML compatibility mark," stated the report.

This has left the "heavy hitters" in the computer-based publishing market looking for new ways to attract users — either by adding features, changing their product positioning or becoming more specialized. Quark is a perfect example of this. For years Quark was happy to make lots of money from an enthusiastic band of QuarkXpress users running their software on Apple Macintosh systems.

But in the last year or two, all that has begun to change. Not only

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Dealer Only

has Quark ventured into Web publishing territory with applications such as Inroads, but it has also made a much bigger commitment to the Windows market and expanded its networked and "work-flow" applications.

Quark Does Windows

The commitment to Windows is a significant change for Quark, which has traditionally made the Mac its flagship platform — leaving Windows users of Quark products sometimes complaining that their implementations had been "robbed together" after the Mac product.

In mid-March, Quark and Microsoft announced what they called "a strategic alliance" wherein Quark will adopt Microsoft technology as the reference platform for future Quark technologies. The companies have said that this mutual support will be manifested in three major relationships: technology, business development, and joint sales and marketing.

"Our strategy is to focus on technology that anticipates our customers' needs, and then helps them meet the needs of their customers as well," explained Susan Friedman, Quark vice-president of product management. "The publishing industry is changing rapidly. Microsoft provides the most extensible, robust platform for application development that will enable us to continue to deliver the sensitive solutions our customers need."

Quark is thus joining the merry band of Microsoft Certified Solution Providers, meaning that Quark will be able to take advantage of enhancements in future versions of Microsoft operating systems and servers, plus technical briefings and support. As a result, Quark has

also committed to architecting its systems on Microsoft's

COM and DCOM technologies and participating in alpha and beta programs to ensure its products are certified for Microsoft BackOffice and Windows.

The company wanted to be aware that this news might not go down well with its Macintosh users and was careful to issue a statement designed to appease them. "Quark's recently announced alliance with Microsoft in no way lessens our commitment to supporting our desktop publishing applications for the Mac OS," said Quark in a statement. "The alliance is a logical result of our expansion into the client/server solutions arena in which Windows NT plays a major role. Contrary to (unpopular) misperceptions, we are not dropping the operating systems and the group of customers that have made Quark so successful in the past. We are simply anticipating the technologically complicated needs of new markets and taking the steps necessary now to meet those needs when the time comes. The alliance in no way indicates a halting of support for QuarkXPress, QPS, and Inroads for the Mac OS." (So there.)

Of course, Canada's biggest participant is Corel Corp., which produces both CorelDraw and Ventura Publisher (formerly owned by Xerox Corp.). In fact, Corel announced a new version of Ventura Publisher in mid-March that is designed to be easier to use, better for publishing Web sites and providing improved integration with other Corel products.

Another Adobe seems to have come out the best in all this, recently producing hotbed-up versions of products such as PageMaker and Photoshop, which have successfully blunted the ability to produce professional-looking paper publications with a strong capability to handle Web site design.

In short, these are challenging days for the world's desktop publishing powers. It would appear, however, that with some nimbler moves to support popular industry platforms (such as the Web and Windows 95) and enough enhancements to keep its core of Mac-based users happy, all the major players will likely survive beyond the millennium. □

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Viruses and Revitalization: Symantec in 1998

by Jeff Evans



Virus News

One area where Symantec remains strong is in anti-virus software. As a key player in developing the world-class tool in the anti-virus market, Symantec's SARC anti-virus facility is one of the most active and advanced anti-virus research operations in the world. Symantec's investment in a top-notch research facility has resulted in a strong continuing market share for the Norton Anti-Virus title.

SARC has recently concentrated on handling new strains of many viruses, using sophisticated heuristic "searching" software to identify potential virus code. According to Symantec, a large majority of new virus reports received by SARC involve macro viruses, even though there are far larger numbers of other virus types, such as fast-mailer and polymorphic viruses in circulation compared to the slower macro viruses.

Macro viruses spread rapidly over LANs and via the Internet, since they are loaded inside legitimate and harmless-looking Word and Excel files. They are relatively easy to program, compared to other types of viruses. Also, according to SARC, viruses can develop spontaneously—for example, when regular macros are randomly corrupted by power failures in the system they are being saved on, or through other, poorly understood means. These randomly generated macro viruses only occur in Office 95 applications. Office 95 has a feature that seems to ensure files are fed to Excel as, as well as this new form of virus "injection," some macro viruses are actually "leaking" according to Symantec. One macro virus inserting its code into an already infected macro can continue code to create a third, different strain. However viruses are replicating, Symantec can expect an endless horizon opportunity in the virus market, unless Microsoft decides to put a full featured virus checker into its operating system.

If that happens, Emsisoft claims Symantec would need to be the first to try to retain their traditional market, as other vendors have recently done.

Symantec, the Cupertino, Calif.-based publisher of popular Windows and Mac programs such as the ACT! contact manager, Norton Anti-Virus, WinFax Pro and Norton Utilities, expects 1998 to be a banner year, due to a flurry of new product releases, especially those related in one way or another to the Internet.

Symantec first gained prominence through its ownership of Norton Utilities (NU), a package of software which made the early versions of Microsoft DOS and later Microsoft Windows, much more usable. Norton Utilities' role of the transportation, data recovery and system tools were a godsend to early PC users struggling with the gaps in the basic MS operating system.

More recently, Symantec purchased Canada's Belcon Corp., the publishers of WinFax Pro, the market-leading fax file software. Then, for a couple of years, the company seemed to lose its way somewhat. Improved new versions of Microsoft Windows contained at least basic versions of many of the utilities that made Norton Utilities so successful, and there were even basic fax functions in Windows. From Windows 3.11 onwards Symantec also came out with a Windows 95 version of Win Fax Pro that contained major bugs, especially in terms of allowing connections between different kinds of local and Internet modems.

In 1995, however, Symantec seems to be a better position to begin growing again. It has new, improved versions of ACT! (4.0), Norton Utilities, WinFax Pro, and Norton Anti-Virus either in release or due shortly. It is finding, in fact, that Microsoft has perhaps underestimated by giving its anti-virus products in particular, a fresh shot in the arm.

In a test of the Symantec Anti-Virus Research Centre (SARC) in Santa Monica, CCM now confirmed how Symantec succeeds and intends to combat the latest in computer viruses. Computer users around the world send in diskettes or even entire hard drives suspected of being infected with a computer virus. Anti-virus lab technicians analyze the data, and isolate suspected viruses. Thousands

of new viruses are identified each month, most of them fairly minor variations of known viruses. However, a relatively new category of viruses, called macro viruses, are creating special concern.

Closing The Gaps In Windows

In discussion with CCM, Symantec CEO Gordon Eubanks outlined the philosophy that has allowed Symantec to maintain a steady course in the often perilous Windows utility market. Right from the beginning, Eubanks says, Symantec was intent that its utilities published by Symantec would always be at risk of nearly instant product obsolescence whenever the Apple Mac or Microsoft Windows operating systems came out without new versions that added features that formerly required a third-party software program. For instance, when Microsoft added basic filing capabilities to Windows, beginning with Windows for Workgroup 3.11, Symantec's WinFax Plus product, which had been a popular part of many PC hardware makers' software bundles, became much less usable. In point of fact, though, the Microsoft file software proved to have some bugs, and recently Symantec actually signed an agreement to license a basic, featured fax utility to Microsoft.

Whenever Microsoft adds an new feature that seems to compete with a Symantec utility, Symantec doesn't go head to head in competition against Microsoft, according to Eubanks. Instead, they follow one of several possible strategies:

- Get out of the product category.
- Or a better, much more highly featured product, attractive to professionals and other power users while conceding the entry-level market to Microsoft's "free" version. This has been the approach with the Norton Utilities and Norton Anti-Virus products.
- Find other software publishing opportunities, and either buy or develop entirely new products. ☐

Jeff Evans is Associate Editor of Canadian Computer Wholesaler. He is based in Toronto and can be reached at jef@vexon.ca.

Are you currently in your own business as a retailer? If not, have you ever been tempted to buy a business?

About 23 per cent of the small business population entered the wild and woolly world of entrepreneurship through that door. Maybe you want to get into an established business for the first time. Possibly you want to expand or diversify your existing business by buying another.

Whatever your motivation, when searching for a business, there are a number of classic warning signs that should alert you to potential problems. Buying the wrong business could result in a financial disaster.

Here are some common warning signs of which you should be aware.

Unfamiliar business?

It would be a serious mistake for any buyer to invest in a business that the buyer knows nothing about. The dangers in entering the enterprise are accentuated by inexperience and unfamiliarity. If you are the potential buyer, you could be buying a business totally unrelated to your personal skills, talents or interest. You would be at a considerable disadvantage in trying to survive and compete with your competitors.

Partner-run business?

Some business partnerships that are based on sound economic data can work out well and may be worthy of your consideration. On the other hand, many business partnerships do not survive in the long run. This could be because of conflicts of personality, philosophy, policy, priorities, or contribution of money, time, or skill into the business. Some unstable and undesirable business operations attempt to defraud the unwary investor by obtaining an injection of funds into the business and then using those funds in an inappropriate fashion without any controls. The example, investment funds could be used for paying post-children's debts rather than for working capital for future needs and growth. Be cautious of any business partnerships that promise a disproportionate return based on the investment of money or time.

Business which uses up all investment capital?

If you are considering a business that would require all of your financial resources to pay the purchase price, you would be in a situation that you are starting off undercapitalized, without working capital or reserve for future needs. For example, if you take over a business and there is a decline in sales and profit during the transition phase, you would not have any resources to be able to buffer the financial crunch. Never buy a business without taking into account your working capital and contingency fund.

High pressure to buy?

If you are experiencing a situation in which the seller or an agent of the seller is putting considerable pressure on you to buy the business, resist and be wary. Possibly the seller is ready to go under or is dis-

posed to sell for some other negative reason, for example, competition opening up nearby. Possibly the agent is eager to make a commission or the listing will soon run out. Never put yourself in a situation where you have to make a quick decision on something as critical as buying a business.

Emotionally based interest?

If you are considering a business that you have a very positive emotional feeling for, and that feeling tends to dominate the decisions you are making, don't proceed any further. Emotional over-enthusiasm, unrealistic expectations, overly inflated projections and excessive optimism can quickly turn into a financial disaster. A business that you buy has to make objective

good business sense first, in terms of being a viable idea at a price that you can afford.

Owner claims cash-shortcoming?

A business owner may try to induce a sale by claiming that the financial statements do not accurately record the actual amount of cash that has come into the business. The seller could claim incorrectly (and obviously not in writing), that half of the cash is pocketed without recording or paying tax on it. Don't purchase such a business. The situation would mean that you couldn't rely at all on the financial records, which places you at high risk. In addition, you cannot base your purchase price on the assurance of the seller that they avoided taxes. Obviously the seller is not credible and consequently the business is not credible enough to consider any further.

Fading or distressed business?

Don't proceed any further if you are considering a business that is going through serious financial problems. The exception would be if you are an expert in that type of business, have already identified the reasons for the financial difficulties, and know that you have the expertise and management resources to turn it around. There are people who buy businesses with a turnaround strategy in mind, and skillfully negotiate a purchase package that is very attractive. This can be done effectively of course, only if the buyer knows what they are doing and is sophisticated in this type of distress purchase.

Remember, before you decide on any business, check it out thoroughly. Ask lots of questions, compare shops, be objective (not emotional), and speak to others in the industry. Finally, get professional analysis, feedback and advice from a smart-savvy accountant and lawyer.

Douglas Gray, LL.B., formerly a practicing lawyer is a Vancouver-based consultant, speaker and author of 16 best-selling books, including The Complete Canadian Small Business Guide, published by McGraw-Hill Ryerson.

RISKY



By Douglas Gray

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What are the warning signs to avoid buying into a bad company?

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Interrupt, without apology!

Microsoft's new PC99 standard hopes to address the issue of limited interrupts, but what's taking so long?

by Alan Zimmerman



(Oh where, oh where have your interrupts gone?)

Sort of like your kids (or mice), whenever any of the devices attached to the computer need to get some attention from the CPU, they have to interrupt it. Unlike our children, they can only do that if they have an interrupt request (IRQ) number. If given them the ability to do so on the CPU's time.

Part of the appeal of the PC-style computer is its upgradability. Sealed box, non-upgradable versions have been released from time to time (and are under discussion yet again in one way or another corporate computing's Total Cost of Ownership (TCO)), but have never attained mass-market acceptance. However, in order to be able to easily add hardware to a PC, there need to be available IRQs. Otherwise, the new devices can yell for attention all they want, but the CPU will never hear them. In other words, they won't work.

The original IBM PC and XT offered a mere eight interrupts, most

of which warily (and often for by devices such as the keyboard and the floppy disk drive. In 1984 IBM doubled the number to 16 with its AT model. And that's where we've stayed ever since. During those 14 years, processor speeds have gone from 480K to 333MHz, and hard drives have grown from the AT's original 10MB to nearly 10GB.

It used to be that a typical new PC had somewhere between three and five free interrupts, but those numbers have been slowly whittled down as systems come more fully equipped. You may be shopping for buying systems with empty slots (particularly as more and more functions come integrated right onto the motherboards), but unless you have five IRQs those slots are unusable. And some of today's fancy adapters require two interrupts each!

Ironically, while the Mainframe started life as the proverbial sealed box, lacking expansion ports, the adoption of built-in SCSI in 1984's Blue-Plus has proven a wise choice. SCSI allows relatively easy addition of up to six devices, and when implemented on a PC, those devices all share a single interrupt. But aside from a few areas such as high end network servers, SCSI has never really caught on as a PC solution, where the added cost and complexity of SCSI hampered its adoption.

There have been other recent proposals to get around IRQ-missing. Like Universal Serial Bus, which allows connection of up to 256 devices sharing a single external USB bus. Presumably, we could be seeing keyboards, mice, sound cards and scanners all using a single interrupt. But USB still hasn't caught on, though most modern motherboards are shipping with at least the possibility of adding a USB port. We'll see if the upcoming release of Windows 98, with built-in USB support, provides the technology its long-needed jump-start.

The villain in this scenario is the AT's now-outdated ISA bus. Even when the system's not using any ISA cards, on today's motherboards the keyboard, the parallel and serial ports, hard drive and floppy controllers are all connected to the ISA bus, along with other functions built into the motherboard.

Last year, when Microsoft released its PC98 specifications, it badly called for the demise of the ISA bus. But even today Microsoft has lacked the power to impose its will on the classic PC industry. At the recent seventh annual WinHEC (Hardware Engineering Conference), Microsoft again attempted to set standards this time presenting a trial version of recommendations for PC99, tentatively aimed for implementation in Year 2000 models. In the meantime, implementation of the PC99 proposals to finally seeing its end to the ISA bus and the shortage of IRQs have been postponed, yet again.

Take a good look at the systems you're buying, selling, or distributing. Use the Windows Device Manager (or even the old DOS MSD utility), and check how many IRQs are in use, how many are free for new devices. Be prepared — it's a question that your most astute customers may very well be asking you. But who has the courage to be the first to release a PC without a 1984 legacy ISA bus? ®

Alan Zimmerman is a computer journalist and reviewer living in Vancouver. He can be reached at alan@compuserve.com.

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The Fine Line Between Promotion and Spam

"Automatically generated e-mail has its dangers," I assume. Send too much, send it more than once, or send it to the wrong parties, and you may be accused — or guilty — of spamming."

by *Gerrit Bennett*



we have work to do to set up our shops, defend our business and get the message out there.

E-mail

One of the key ways Internet contacts can be established is, of course, via electronic mail. According to a recent study reported on News.com, e-mail has emerged as the number one method of customer-vendor contact and many suppliers are passively drowning under the ever-increasing tide of e-mail.

At any rate, the real likelihood is that, sooner or later, you are going to need to improve your ability to efficiently respond to e-mailed information requests. Here at Canada Computer Paper Inc., as you might imagine, we get an awful lot of e-mail, so we've had to deal with these issues. Some of the ways we've found for managing requests for information include having "bots" that automatically provide information on certain topics. You could, for example, set up a "bot" to automatically send a price list or a product specification sheet in a request sent to an e-mail address like "info@yourcompany.com." For maximum efficiency, provide several e-mail addresses on your Web site, where visitors can categorize their response, depending on, for example, the relative to sales, tech, technical help or a problem with the Web site.

You can use a "bot" to thank people for writing, to let them know that their letter has been received and that it will be read. (At Canada Computer Paper Inc., we use the FastClass Internet Server from Markham, Ont.-based SoftArc as our primary e-mail sys-

tem, although similar capabilities are available in a wide array of other products.) Remember, however, that a "bot" is no substitute for a personal reply. Although the bot provides an immediate response to let people know their message made it through and that it's appreciated, such responses may follow unless you then follow up with a real human reply.

Automatically generated e-mail has its dangers, of course. Send too much, send it more than once, or send it to the wrong parties, and you may be accused — or guilty — of spamming. In general, we'd recommend providing a pre-checked checkbox on your request-for-information Web page that allows the people who use it to decide whether they would like to receive future product information on updates or promotional offers from you. If they agree, their names can be added to a mailing list, electronic or otherwise.

Walking The Line

Remember, the line between promotion and spam gets just a little too fine, as Apple Computer Inc. discovered after the release of its QuickTime 3.0 software for Macs and 32-bit Windows PCs. QuickTime 3.0, you see, came with its license agreement that stipulated a way for developers who include QuickTime with their products to avoid a hefty US\$1 per copy licensing fee. The catch is, developers that want to avoid this revenue for each call an API that copies a promotional movie to the end-user's desktop every time he or she uses the product. In other words, it is fairly to define this close-like fit — it supports next time you run the program unless the user pays US\$30 to upgrade to "QuickTime Pro." That "disturbance" concept, while clever, is unfortunately making the use of developers and users alike. I only hope that it doesn't catch on.

Can you imagine what a awful mess (not to mention the tech support nightmare) we'd have if everybody started doing this?

Just think of the best Microsoft could take if it pulled a stunt like this.

For more info on QuickTime 3.0 and its new capabilities, see the article at <http://www.ppcworld.com>.

Fishing For Hits

Another popular way to draw business to your Web site is via the inclusion of what are known as "meta tags" embedded into the HTML code that defines the page. Some of today's more sophisticated Web-authoring tools are database-driven and these tools can generate these bits of meta-tags automatically. Even if you add the tags manually, you are increasing the likelihood that a customer looking for the product or service you offer will find your page near the top of the list of results displayed by a search engine.

There are dangers here too. For example, as is probably pretty obvious, unscrupulous sites often stuff thousands of meta tags on a wide array of naughty words into their meta tag lists (and, as a disturbing trend, a growing number stuff porn-like words associated words that happen to be common generalized search terms, as well). However, you shouldn't go appropriating the trademarks of others, as your meta tag list. Playboy Enterprises is suing one such porn-site, which was fishing for hits with tags like "Playmate," "Playboy" and so on. If in doubt, we'd recommend legal advice.

Meta tags were discussed in depth in a recent article appearing in *The Computer Paper* (see <http://www.cpcpaper.com/Marketing>). There is an alternative to search engines that can bring visitors to your site — and usually the right kind of visitors, too. I've called it *webfishing*. Find out more at <http://www.webfishing.org/>. ☐

Gerrit Bennett is the Editorial Director for Canada Computer Paper Inc. and a former computer retailer. He can be reached at gerrit@ccp.com.



Okidata adds 20-ppm printer

Okidata of Mississauga, Ont., has introduced the OkiPage 20 Series, including a 20-ppm printer with standard duplex printing.

Printing starts at \$1.499, and all the printers are driven by a 40MHz KRC processor. They come standard with a 330-sheet input tray and a 100-sheet paper feeder. The products are supported by a three-year warranty on the LED print-head, and a one-year on-site limited warranty on parts and labor.

Okidata can be reached at (905) 238-4730.



IBM Corp. rolls out new line of high-speed systems

IBM Corp. has announced systems to take advantage of Intel's latest 350MHz and 400MHz Pentium II chips. IBM introduced its new line of Windows NT IntelliStation M Pro "personal workstations," which can run up to two 400MHz Pentium II processors. The new IntelliStations also incorporate new manageability and security features, including IBM Asset ID, Asset On LAN, and LANConnect Control Manager (LOCM) 2.0. IntelliStation M Pro models start at a suggested price of \$5,375.

IBM also announced a new ultra-light ThinkPad 600 multimedia notebook that weighs less than five pounds (about 3.5 pounds) with removable CD-ROM drive, at a price ranging from around \$4,500 to \$6,500, depending on configuration.

IBM has moved into the 19-inch monitor market, starting at a suggested list price of \$1,116 for the C74 model. And the company announced a price reduction in its network computers, with the entry-level model 160 now priced at about \$700.

IBM Canada Ltd. has expanded its Aptiva Series of PCs with the addition of the Aptiva E56, E64 and E86, priced at \$2,399, \$2,449 and \$3,049, respectively.

The E86 includes DVD technology. The E56 and E64 have 256MB Level 2 cache, 360MHz and 300MHz AMD K6 processors, 48MB-to-64MB RAM, 4GB hard drives, a 34X CD-ROM drive and a K6-5 Pentium. The Aptiva E86 includes a 300MHz



Intel Pentium II processor, 64MB of RAM, a 8GB drive, 312MB Level 2 cache, a DVD-ROM II drive, a K6-5 Pent processor, and a variety of multimedia features.

All sales include the World Book Multimedia Encyclopedia CD-ROM, and 90 hours or 90 days of free Internet access.

Visit <http://ibm.ca> for complete specifications.

UMAX introduces slim line ActionBook 500 series

UMAX, Mobile Computer Group has launched the ActionBook 500 series, a slim-line product designed to offer flexibility and adaptability.

The notebook weighs 3.5 pounds and features a 166MHz or 233MHz Pentium processor with MMX technology, plus a 15.3 inch TFT screen. Memory starts at 32MB (expandable to 8MB).

The ActionBook 500 is priced from US\$1,999 to US\$3,499, depending on configuration.

See <http://ibm.ca> for a complete review.

NEC Canada adds flat-screen displays

Offering a very large flat screen system that includes print capability, NEC Technologies Canada of Mississauga, Ont., has released a

20.1-inch MultiSync LCD2010, priced at \$9,499.

The company also launched two 15-inch flat-screens — the MultiSync LCD1510V and LCD151D, priced at \$2,199 and \$2,599, respectively.

On the CRT front, NEC has launched the MultiSync E860 19-inch monitor, which offers a 1,600 by 1,200 resolution at 75Hz, with a 0.28-mm dot pitch. It's priced at \$1,199.

NEC can be reached at (905) 709-3600. ☐



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Rick Reid

Tech Data Canada gets new president

Rick Reid started this month as the new president at Microscape, Ontario-based Tech Data Canada. Reid was most recently senior vice-

president of SHI, Systemhouse Inc. "This is an exciting transition to what I've been doing," said Reid, in an interview prior to starting the job. "It's a great company, with a lot of opportunity."

Reid said he wouldn't talk about specific plans for his new job at this time. He said current issues facing distributors include unique pressures, and insufficient vendor support for the channel.

Reid is replacing Elton Levy, who completes a three-year international assignment and returns to the Tech Data Corp. corporate office in Clearwater, Fla. Reid said Levy did a "fantastic job" at adding sales and growing the business.

Reid has more than 23 years of experience in the Canadian computer industry, including stints at Unisys Canada Inc. and Cromtek Business Systems Inc.

Cancom has new chief

(NAB) — Canadian Satellite Communications Inc. (Cancom) has promoted Darlene McEwen to the post of president and chief executive.

McEwen, formerly Cancom's vice-president of business development, replaces Allan Gould.

McEwen said in a teleconference with industry analysts and reporters that he plans to review Cancom's strategic business plan over the next few weeks and look for opportunities for further improvement, but, he added, "I am entering a market that is very strong." McEwen said his long-term goal will be to continue to build shareholder value in Cancom, but that "for the time being, I'm very much here to listen."

McEwen was also named to the company's board of directors, so was Robert Manning, a director of WIC Western International Communications Ltd.

Archer names vice-president

Archer Enterprise Systems Inc., a Toronto developer of sales force automation software, has named Shon Wodde as vice-president, research and development.



Shon Wodde

He is responsible for the technical development of the organization's sales force automation software products and services. Wodde has 22 years of industry experience. Prior to co-founding Archer with Rukh McCauley in 1998, he held positions with Northern Telecom, IBM Canada Ltd., Microsoft Canada Inc., Symantec Corp. and AT&T Canada Inc.

In January, he was appointed to the executive board of the Association of Microsoft Solution Providers and has been a member of the Symantec Axi Certified Consultants advisory board.

Merisel president resigns

Robert McInerney has resigned as president and chief operating officer of Merisel Inc.

"I've enjoyed the past year with Merisel," said McInerney in a statement. "And I've been impressed with the pace of the progress that the company has made. However, relocating from the East Coast to the West Coast has not been as easy transition. As a result, I have made the decision to return to my family and my home in New York. Merisel's management team is strong and talented, and I have no doubt that they will continue to build on the momentum that Merisel has gained."

Chief executive Dwight Steffensen will assume the title of president, and Merisel's executive vice-president and chief financial officer James Iltis, will take responsibility for Merisel operations as executive vice-president of operations and finance, retaining the title of CFO.

The company also announced that vice-president of finance Timothy Jensen has been appointed to the role of senior vice-president of finance, overseeing all of Merisel's financial operations, including financial strategy, planning and analysis.

Vice-president of North America operations, Ricky Stephens, was appointed to senior vice-president of North American operations, overseeing all aspects of Merisel's distribution, configuration and channel assembly, claims, customer service and traffic for the United States and Canada. ■

Calendar

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http://www.convergence98.ca

May 18-19

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http://www.newmedia.ca

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May 20-23, June 4-8,
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June 8-9 — Vancouver
July 20-21 — Calgary
Aug. 10-11 — Montreal

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http://www.globalknowledge.com

May 18-22

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http://www.ctiexpo.ca

June 14-17

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Atlanta

http://www.comdex.com

June 18-19

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Nominations will be evaluated by a panel of Editors from Canadian Computer Wholesaler and Canada Computer Paper Inc. The winners will be featured in a special July 1998 issue. Nominations close May 15, 1998.

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Report from Bramham

Services Industry Is Growing

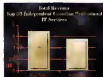
by Leslie Arnold and Margery Leach

The Canadian IT professional services industry has developed a strong presence both within Canada and in international markets. This industry showed significant growth in 1997, demonstrating that the market is still very much alive for system integration, custom application development, IT education and training, and IT consulting.

The Bramham200 database, which tracks the top 50 independent Canadian professional services companies based on annual revenues, indicates that the top 50 Canadian professional services organizations collectively generated \$1.3 billion during 1997. This represents a 24 per cent increase over the \$1.4 billion generated in 1996.

Furthermore, these top 50 companies are responsible for employing more than 16,500 people worldwide.

Some of the Canadian industry's key players are such globally known entities as



Deloitte & Touche, EDS Group, PROCOM, Andersen Consulting and The CGI Group. CGI holds the number one position, reporting revenues of \$232 million in 1997.

The top services companies are relatively mature, with 40 of the top 50 companies established prior to 1990. In contrast with the software industry, the sector of the IT industry is not prone to public trading, with 82 per

cent of the top 50 companies being privately held. Intense competition has created a changing face for the sector, which is characterized by a high degree of industry consolidation. This past year has seen some major mergers and acquisitions take place within the top professional services companies worldwide such as Cooper and Lybrand merging with Price Waterhouse and Ernst & Young merging with KPMG.

In Canada, the CGI Group Inc. has maintained an acquisition-based growth strategy as witnessed by its purchases of CDSL Canada Ltd. and Bell Syntex.

The professional services industry is expected to continue to play an important role, despite the apparent increasing sophistication of users. Your 2000 conversion issues alone have taught us that technology has touched almost every aspect of our lives, and our dependence on the experts is likely to continue. ■

Leslie Arnold and Margery Leach are consultants of The Bramham Group Inc. in Ottawa (http://www.bramham.ca) — an international marketing and management consulting firm with a stated commitment to "Delivering competitive advantage to the IT industry." Phone: (613) 743-2383 or fax (613) 743-4990.

Reader Poll

Last issue, we asked:

We asked you to predict the most likely scenario in the handheld market a year from now.

You said:

- 29%** SCon's Palm platform will be by far the leader in the category, in terms of revenue and unit share.
- 30%** Windows CE handhelds will come into their own in the next year, and market acceptance will happen in a big way.
- 9%** Some other next-generation handheld product will emerge and will be on its way to capturing the market.
- 32%** Handhelds will be a fairly insignificant market category.

This issue:

Our Lab Test (page 40) reviewed a number of ink jet printers on the market. But we'd like to hear about your experiences with selling ink-jet products to your customers.

Our question to you:

When it comes to YOUR customers, which is the highest priority criteria for their ink-jet purchases?

- ☐ Quality of black printing
- ☐ Quality of color printing
- ☐ Speed of printing
- ☐ Price of the printer

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310mm x 305mm

Brillant IV

- Intel 82443BX AGP set
- Intel 82371AB (PIIX4E)
- Dual Intel Pentium® II Processor
- One AGP slot
- 66/100MHz
- Three 168 pin 3.3V unbuffered 100/66MHz DIMM sockets
- Supports slow down, suspend to memory, suspend to hard disk
- Supports Security Mode (Disable power button, reset button and keyboard input until password accepted)
- Supports KB wakeup, PS/2 mouse wakeup, infrared wakeup (option)
- LM80 monitors 2 fans' speeds, 7 power supply voltages, chassis intrusion, mainboard temperature
- 2 MAXIM 1617 monitor the temperature of two CPUs (option)

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